

Simulation Analysis Impact of Transaction Cost on Economic Behaviour of Cattle-Coconut Farmers' Household in Bolaang Mongondow

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Abstract. Beef cattle farming in Bolaang Mongondow are the source of household income which is in fact still run traditionally and hiring family members. The problem faced is the price received by the farmers is less than the selling price minus transaction cost. This research aimed to analyze the impact of transaction cost, input and output prices on economic behavior of cattle-coconut farmers' household. This research applied survey method and the collected data were data cross section and data time series. Purposive sampling and simple random sampling were used to determine the research location and respondents (233 households), respectively. Data analysis was simulation analysis using SAS 9.0 program, served in 6 scenarios with combination of transaction cost, output price, input price and wage. Model validation was done prior to the simulation to find the correct model. The result showed that the model applicable for long term was scenario 4. Broker cost, copra shipping cost combined with output price also decline of cow shipping cost, administration cost, retribution and copra shipping cost combined with output price gave significant impact towards income and welfare of cattle-coconut farmers' household in Bolaang Mongondow.

Keywords: simulation analysis, transaction cost, beef cattle farming, coconut

Abstract. Peternakan sapi di Bolaang Mongondow adalah sumber pendapatan rumah tangga yang faktanya masih dijalankan secara tradisional dan menggunakan tenaga kerja dari anggota keluarga. Masalah yang dihadapi adalah harga yang diterima peternak lebih sedikit daripada harga jual dikurangi biaya transaksi. Penelitian ini bertujuan menganalisa dampak biaya transaksi, harga input dan output terhadap perilaku rumah tangga petani-ternak kelapa. Penelitian menggunakan metode survei dan data yang dikumpulkan adalah *data cross section* dan *data time series*. Purposive sampling dan simple random sampling digunakan untuk menentukan lokasi dan responden penelitian (230 rumah tangga). Analisis data adalah simulasi menggunakan program SAS 9.0, dilakukan dalam 6 skenario dengan kombinasi biaya transaksi, harga output, harga input dan upah. Validasi model dilakukan sebelum simulasi untuk menemukan model yang tepat. Hasil penelitian menunjukkan bahwa model yang bisa diterapkan untuk jangka panjang adalah skenario 4. Biaya makelar, biaya pengiriman kopra digabungkan dengan harga output memberikan pengaruh yang besar terhadap pendapatan dan kesejahteraan rumah tangga petani-ternak di Bolaang Mongondow.

Kata Kunci: analisis simulasi, biaya transaksi, peternakan sapi, kelapa

Introduction

Beef cattle farming are one of cattle that are potential for development in village to provide meat as one of the income resources for the households and labor resource in village. Cattle also serve as potential job demand supplier,

savings and exchanges and land quality revitalization. Beef cattle farming in North Sulawesi have been made the main sector by the government to increase economic growth especially from farming subsectors.

Most beef cattle farming in several areas are still run traditionally (Ella et al., 2004, Kariyasa

and Pasandaran, 2004). Beef cattle farming in North Sulawesi are mostly small holder animal farmers with traditional farming technology to present day. Traditional farming is that represented by farmers of small farming area with 1-2 cattle (Prawirokusumo, 1990). Small holder animal farming according to KEPMEN No. 404/2002 is a side-job farming venture with maximum 100 heads of beef cattle. However, the existing small holders has not gained that maximum standard. The characteristics of folk farming are of small scale, household production motive, side-job, and traditional technology.

The characteristics of beef cattle farmers' household besides involving in agricultural activity (coconut), food plants and other seasonal plants, is also running beef cattle farm. However, the main character of the farmers' household shows that the farming is a hereditary side job, mostly managed by the family members. Family members as the workers are assigned to the job in turn and not specifically limited, therefore it runs the chance to involve all members in the venture so that the number of venture and workers is not varied from year to year.

The cattle trading phenomena in Bolaang Mongondow is the traders come to the farmers so the selling price is subtracted with transaction cost, such as shipping cost. The amount of transaction cost is determined solely by the buyer and remains unknown to the farmers, and this causes imperfect market. Consequently, the price received by the farmers is cheaper than the price they get when they sell the cattle themselves. The household gives commission to the broker, and the amount of commission is determined by the broker. This commission is stated as transaction cost.

The implication of transaction cost is a problem influencing the household decisions about production, labor allocation and consumption. The rise of transaction cost causes

market failure. Matungul et al. (2006) stated that a very high transaction cost may affect input market and output market. Moreover, Dutilly-Diane et al. (2003) studied that market failure in farmers' household was caused by transaction cost.

The phenomena above are the economic behaviour of beef cattle farmers as the producer in economic activity. Household serves as producer in an effort to increase cattle production, either beef cattle or drought cattle in order to raise income. The income rise relates to consumption increase. The higher the income, the higher the consumption tends to be. However, the income rise is also closely related to the output and input price. One of the ways for this problem is the government policy to determine output and input price.

Government policy to develop farming especially beef cattle was providing aid in forms of cattle or cash funding to raise household income of cattle-coconut farmers which later increase their welfare. The government invested in farming to anticipate cattle and cattle product import, namely beef; however, the fact showed this effort was quite unsuccessful.

This research aimed to analyze the impact of transactional cost, output cost, input cost, direct wage, transaction cost, also the impact of decrease cattle selling commission toward the economic behaviour of cattle-coconut farmers' household in Bolaang Mongondow.

Materials and Methods

This research applied survey method to the sample of cattle-coconut farmers' household in Bolaang Mongondow. Data were collected through interview with the farmer respondents using questioner. Data used were cross section and data time series from primary and secondary data. Primary data (a year cross section) were

gained from direct interview with respondent, while secondary data (annual time series) were from the institution related to this research and from the published research result.

Subdistricts and villages as the research area determined by purposive sampling were those having the most beef cattle and dominant coconut commodity, namely Bolangitang (Saleo, Bohabak, Biontong), Lolak (Lolak, Mongkoinit), Lolayan (Mopusi, Lolayan, Mopait), and Dumoga Barat (Kinomaligan, Wangga Baru, Kosio, Ibolian). Samples of farmer household were limited to those having minimum 2 heads of cattle and ever sold cattle. As many as 233 respondents were taken by simple random sampling method based on the number of cattle-plant farmers in each village,

Simulation analysis using SAS 9.0 program was used after validation model. Sitepu and Sinaga (2006) stated that simulation was done to find the correct model and the change of endogen variables as one function from one or more exogenous variables. This criterion was based on goodness of fit statistics. Model validation was done to know whether one model is good enough and accurately describe the actual information or able to make prediction value for endogen variables not far different from the actual values. Model validation used statistic criteria of Root Mean Squares Error (RMSE), Root Mean Squares Percent Error (RMSPE), coefficient determination (R^2) and Theil's Inequality Coefficient (U) (Pindyck and Rubinfeld, 1991).

Simulation analysis was done to study the impact of the change of output price, input price, wage, transaction cost, and impact of cattle selling commission cutback towards household economic behaviour. The analysis of change was the combination with 10% change based on the fact that annual rise of cattle selling commission is 10-20%. Policy variables in this research were input price and output price, while non policy

variable was transactional cost. Input and output prices were the policy variables in Kusnadi (2005), Asmarantaka (2007), Bakir (2007) and Priyanti (2007). Priyanti (2007) made 10% simulation for every change in policy and non policy variables.

Results and Discussion

Simultaneous model for cattle-coconut farmers' household economy in Bolaang Mongondow consisted of 35 endogen variables. Validation results showed 21 endogen variables (60%) had 100% lower RSMPE value. Sitepu and Sinaga (2006) stated that the lower RSMPE could be used as prediction. 100% lower RSMPE means prediction value could follow the tendency of historical data with an under 100% error rate in every equation.

Validation analysis showed endogen variables with U-Theil value < 0.30 for model of economic behavior of cattle-coconut farmers' household in Bolaang Mongondow was 26 (74.29 %) and the rest endogen variables with U-Theil value > 0.30 was 11 (25.71 %). It showed that economic behavior of cattle-coconut farmers' household in Bolaang Mongondow was a good model.

Based on validation analysis, this model was apt to simulation (Pindyck and Rubinfeld, 1991; Sitepu and Sinaga, 2006). Transaction cost caused market failure. According to Sadaulet and de Janvry (1995), transaction cost broke the separable assumption. Transaction cost might affect the production process, labor allocation and consumption expense. Transaction cost affected cattle price, corn price and wage. Transaction cost according to Dutilly-Diane et al. (2003) was the price determiner. It caused variation of price and cost, stated as estimated price and cost, as endogen variables. The very high transaction cost based on Matungul, et al., (2006) significantly affected output market, input market, and labor market.

The simulated transaction cost change was done in two ways, first cattle selling commission rise combined with copra shipping cost, output price, input price, and wage (Table 1). Second, cattle selling commission reduction combined with the rise of cattle shipping cost, administration cost, and retribution, copra shipping cost, output price, input price and wage (Table 2).

Several researchers included transaction cost in their research related to household behavior. Lofgren and Robinson (1999) in their research result showed that it was significant to apply specification non separable approach for household. Jaleta and Gardebroek (2007) also conducted a research dealt with market imperfection due to high transaction cost in market. Research by Evenson et al. (2000) showed transaction cost in labor market specifically increased due to two types of information problems, namely (1) moral hazard because the right venture was not easy to test and implement, and (2) detrimental choices because information on heterogeneous workers attribute was not easily available. Moreover, Viaian and Swinnen (2006) analyzed transaction cost and imperfect competition in land market. Mathijs and Vranken (2006) included variables of venture scale, agribusiness scale, period and speed of agribusiness in the research that was external design related to transaction cost stated as dummy variable. Research by Collisson et al. (2005) was focused on analysis of marketing cost and transaction cost throughout the marketing access from agribusiness level. BIRTHAL et al. (2006) also conducted a research related to transaction cost by quantifying real transaction cost in producer, namely cost of travelling, communication, storage, quality and quantity decrease within travelling, credit, counselling, commission and personal time (personal and hired). McIntosh et al. (2007) made a simulation

on how people made decision on agriculture with direct payment scenario.

Combination of cattle selling commission, copra shipping cost, beef cattle and copra price (S1) caused increase in most economic behavior of cattle-coconut farmers' household in Bolaang Mongondow particularly from production side. This alternative was apt to determine policy for the government. Transaction cost served as the estimated cost determiner. Balcombe et al. (2007) stated that the most recent research on shipping and transaction cost held important role to price transmission. Frakler and Tastan (2008) proposed economic model to determine price by developing econometric methodology and simulation applied data of soybean price list. Equation of shadow price by Arnade and Kelch (2007) was estimated simultaneously with output supply and input demand.

One of the applicable alternatives was raising beef cattle selling commission and copra shipping cost combined with input price and cost (S2) considering the fact that household cannot avoid transaction cost rise along with input price and cost rise. Input price such as grass and urea is one of the mostly faced problems in household. Besides, household production often met with limited budget and a harder problem, wage rise. Cost rise depended on labor market. Alternatives of policy and non policy variables gave negative impact towards part of economic activity of beef cattle farmers' household in Bolaang Mongondow despite the positive impact of those variables towards production aspect mainly cattle production and selling.

This phenomenon interestingly gave negative impact towards coconut production because the household of beef cattle farmers in Bolaang Mongondow reduced family worker supply and hired worker demand in coconut venture. This alternative scenario could not be made the basic policy making compare to scenario 1. Time

allocation based on research result was that in cattle and coconut farming stated as endogen variable. It was contrary to Hamermesh (2008) that explained the impact of time allocation towards time to prepare the home industry goods.

In this research, scenario 3 gave a significantly negative impact towards productivity and labor allocation in coconut farming. Symbiosis between land productivity and size of land farming depended on market imperfection. Market imperfection determined the estimated price of

several productive inputs (Assuncao and Braido, 2007). The other applicable alternative scenario was restraining commission by direct selling the cattle or through an institution like cooperative. Transaction cost according to Williamson (2008) was related to institution, therefore scenario 4 to cut down commission combined with rise of cattle shipping cost, administration cost, retribution, copra shipping cost, cattle cost and copra cost (S4). Then, commission cut down was tried to combine with rise of other costs, input price and wage (S5). Based on results of both

Tabel 1. Impact of the rise of cattle selling commission, copra shipping cost, output price, input price and wage towards the economy of cattle-coconut farmers' household in Bolaang Mongondow (%)

Endogen Variables	Scenario 1	Scenario 2	Scenario 3
Cattle Production	22.54	25.50	52.73
Cattle Selling	27.43	30.92	52.73
Coconut Productivity	1.77	-43.61	-41.72
Grass	20.98	20.32	45.76
Cattle Farming Family Wage	1.76	157.82	161.38
Coconut Farming Family Wage	7.27	-57.60	-60.69
Coconut Hired Labor Wage	-0.45	-202.30	-202.27
Cattle Cost in Coconut Farming	0.23	8.77	9.02
Family Labor Wage	-0.83	64.74	63.56
Cattle Commission	10.00	10.00	10.00
Copra Shipping Cost	10.00	10.00	10.00
Food Consumption	3.50	1.42	5.53
Non Food Consumption	8.52	3.46	13.46
Education Investment	8.28	3.36	13.09
Coconut Market Surplus	1.40	-0.14	1.43
Coconut Production	1.04	-23.01	-21.92
Cattle Production Utility Cost	20.78	32.07	59.83
Coconut Farming Labor Wage	1.48	-173.71	-174.52
Cattle Transaction Cost	7.38	7.38	7.38
Copra Transaction Cost	0.58	0.58	0.58
Total Transaction Cost	7.35	7.35	7.35
Cattle Price	29.52	21.64	57.69
Cattle Total Revenue	37.20	-2.50	41.51
Coconut Total Revenue	8.76	51.29	60.72
Total Household Income	16.89	6.86	26.71
Total Household Expenditure	5.28	2.15	8.35
Cattle Shadow Price	10.39	-1.09	10.39
Copra Shadow Price	10.98	-0.06	10.98
Shadow Wage	0.02	9.93	9.93
Cattle Rent Estimation	0.02	9.66	9.66

Scenario 1 : the rise of cattle selling commission, copra shipping cost, cattle price and copra price was 10%; **Scenario 2** : the rise of cattle commission, copra shipping cost, grass, urea and wage was 10%; **Scenario 3** : the rise of cattle commission, copra shipping cost, prices of cattle, copra, grass, urea, and wage was 10%.

Tabel 2. Impact of the cutback of cattle selling commission, copra shipping cost, output price, input price and wage towards the economy of cattle-coconut farmers' household in Bolaang Mongondow (%)

Endogen Variables	Scenario 4	Scenario 5	Scenario 6
Cattle Production	22.66	28.23	55.83
Cattle Selling	31.39	34.54	68.55
Coconut Productivity	1.78	-43.60	-41.72
Grass	23.56	22.53	48.34
Cattle Farming Family Labor Wage	5.94	161.94	165.56
Coconut Farming Family Labor Wage	-17.50	-82.34	-85.47
Coconut Hired Labor Wage	-0.45	-202.30	-202.27
Cattle Cost in Coconut Farming	0.25	8.79	9.03
Family Labor Wage	-0.96	64.62	63.41
Cattle Commission	-10.00	-10.00	-10.00
Copra Shipping Cost	10.00	10.00	10.00
Food Consumption	3.81	1.66	5.83
Non Food Consumption	9.27	4.04	14.19
Education Investment	9.01	3.92	13.80
Coconut Market Surplus	1.52	-0.05	1.54
Coconut Production	1.04	-23.01	-21.92
Cattle Production Utility Cost	23.35	34.49	62.66
Coconut Farming Labor Wage	-4.60	-180.39	-181.20
Cattle Transaction Cost	-10.64	-10.64	-10.64
Copra Transaction Cost	0.59	0.59	0.59
Total Transaction Cost	-10.56	-10.56	-10.56
Cattle Price	32.42	23.95	60.58
Cattle Total Revenue	40.12	-0.49	44.24
Coconut Total Revenue	10.56	53.26	62.70
Total Household Income	18.39	8.01	28.16
Total Household Expenditure	5.75	2.50	8.81
Cattle Shadow Price	13.06	1.58	13.06
Copra Shadow Price	10.98	-0.06	10.98
Shadow Wage	0.02	9.93	9.93
Cattle Rent Estimation	0.02	9.66	9.66

Scenario 4 : Cutback of cattle selling commission, rise of cattle shipping cost, administration cost, retribution, copra shipping cost, cattle cost, and copra cost was 10%; **Scenario 5** : Cutback of cattle selling commission, rise of cattle shipping cost, administration cost, retribution, copra shipping cost, grass price, urea price and 10%; **Scenario 6** : Cutback of cattle selling commission, rise of cattle shipping cost, administration cost, retribution, copra shipping cost, prices of cattle, copra, grass, and urea and wage was 10 %.

scenarios, another scenario was made by cutting down commission combined with other component of transaction cost, output cost, input cost, and wage (S6). In the long run, the preferable and applicable scenario alternative made by the government for the cattle-coconut farmers' household in Bolaang Mongondow was scenario 4. Research result from Henning and Henningsen (2007) showed variables of non

proportional transaction cost and heterogeneity of labor significantly affected household behavior. Farmers ought to participate actively in cattle selling. Research result by Cunningham et al. (2007) showed relation between farmers' being active in selling and net profit.

The determined scenario based on research result affected the economic activity in household including educative investment.

Farmers in Bolaang Mongondow had not showed interest in medical investment. Zheng and Zimmer (2008) stated that farmers had problem of not claiming their medical insurance.

Conclusions

Combination of transaction cost rise (commission, copra shipping cost) and output price gave the most significantly positive impact. Moreover, combination of transaction cost reduction (cattle selling commission), transaction cost rise (cattle shipping cost, administration cost, retribution, copra shipping cost) and output price gave positive impact towards revenue and welfare (expense) of cattle-coconut farmers' household in Bolaang Mongondow.

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